

A survey of Oral Health in Institutionalized Population with Intellectual Disabilities: Comparison with a National Oral Health Survey of the Normal Population

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INTRODUCTION

The number of people with disabilities is globally increasing, mainly because of their higher survival rates due to advances in medical and social care services.^[1,2] As a consequence of the increased number of people with disability, the need for expensive medical and oral health care has also increased. Research has shown that people with disabilities, in general, and intellectual disabilities, in particular, experience poor health and inferior access to high quality health services compared to the normal population.^[3-9] Individuals with intellectual disabilities may suffer more from the

ABSTRACT

Introduction: Compared to the general population, the intellectually-disabled (ID) experience poor health and inferior access to high quality health services.

Aim: To compare the oral health of institutionalized ID Lebanese individuals to that of the normal Lebanese population (NLP).

Materials and Methods: Caries and periodontal indices were recorded in 652 ID individuals (aged 6, 12, 15, and 35–44 years) residing in the 5 major Lebanese governorates. The comparison population was derived from the National Oral Health Survey conducted in 1994.

Results: Six-year-old ID children had an average of 3.28 decayed primary teeth, 0.22 filled primary teeth, and an overall dft score of 3.50, whereas in the general population decayed, filled, and overall dft scores were 4.90, 0.10, and 5.4, respectively. The lowest number of permanent decayed teeth in the ID was recorded in the 35–44-year-old group (3.17) and the highest in 15-year-old group (4.01). In the NLP, the number of decayed permanent teeth gradually increased from age 12 (5.14) to age 35–44 years (7.20). Caries indices were generally better in the ID than that in the NLP, except for more missing teeth in ID adults (6.24 compared to 4.98). The ID population presented with more severe periodontal disease (pocketing) whereas the NLP presented with a greater proportion with calculus.

Conclusion: This study highlighted important differences in oral health and treatment needs in the ID compared than that of the NLP. Policy changes are required if adequate services are to be provided for this group of the population.

KEYWORDS: Caries indices DMFT/dft, community periodontal index for treatment needs, intellectually disabled population, Lebanese, oral health

consequences of oral disease than those without any intellectual disabilities due to their inability to accurately communicate their symptoms and their caregivers' inability to appraise their oral health condition.^[10,11]

In addition to causing physical pain and discomfort, oral disease often results in negative consequences

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regarding self-esteem, quality of life, and general health.^[12,13] Studies have shown that individuals with disabilities, including those with intellectual disabilities, are at a higher risk of experiencing poor health and increased age-adjusted mortality compared to the normal population,^[4,14] highlighting the presence of significant health inequalities.^[15] While the epidemiology of dental disease in people with an intellectual disability has not been extensively studied, several studies have indicated high rates of dental disease in this population, reportedly being the most unattended health problem.^[9,16,17] Assessments of oral health in the intellectually disabled individuals (ID) residing in developing countries are extremely scarce,^[18] however, the situation in Lebanon in particular has received no research attention whatsoever. Despite the presence of a growing population of more than 27000 ID individuals in Lebanon,^[19] data regarding their oral health conditions is lacking.

The aim of this study is to compare the oral health of the institutionalized ID Lebanese population with existing data on the normal Lebanese population (NLP).

MATERIALS AND METHODS

A total of 652 institutionalized Lebanese individuals with intellectual disabilities residing in the 5 main Lebanese governorates were assessed as part of a national cross-sectional study that was carried out between November 2015 and April 2016. Participants belonged to four age groups, i.e. 6, 12, 15, and 35–44 years old. Ethical approval was provided by the Ethical Research Committee at the Faculty of Medical Sciences of the Lebanese University in addition to the Ministry of Social Affairs in Lebanon.

All participants' parents or legal guardians provided permission in the form of written consent prior to enrolment in the study. Individuals who were absent or whose cooperation prevented adequate data collection were excluded from the study.

The sample size was not calculated *a priori* because the aim was to collect data from all institutionalized individuals. All registered institutions for the mentally disabled across the Lebanese territory approved their participation except one located in Mount Lebanon. Housing a total of 703 individuals belonging to the targeted age groups, a total of 689 guardians provided consent (98% response rate), but 14 disabled individuals were absent and 37 were uncooperative, resulting in a final sample of 652 participants (final response rate of 92.7%).

DATA COLLECTION

Clinical information was collected through an oral examination, and data on background characteristics and

behavioral factors were collected via a questionnaire filled by each participant's primary caretaker [Annex1]. The questions explored background characteristics (age, sex, and governorate of residence), arrangement with the institution, characteristics of the primary caretaker (relation to the disabled person and education), the type of disability and severity, oral hygiene practices, and dietary habits (intake of sugar and unhealthy foods).

During oral examination, carious indices and periodontal disease were recorded according to the methods outlines in the World Health Organization's (WHO) oral health surveys (1997).^[20] The number of decayed, missing, and filled permanent teeth (DMFT) was recorded and the periodontal condition was assessed using the community periodontal index for treatment needs (CPITN).^[21] All oral examinations were performed by one examiner (HD) in appropriate lighting conditions, using plane mirrors, explorers, and the WHO periodontal probe.

The comparison population was derived from the National Oral Health Survey carried out in Lebanon in 1994,^[22] which represents the most recent epidemiological study of the oral health of the normal Lebanese population that provides data on 1877 individuals from all age groups targeted by this study.

STATISTICAL ANALYSIS

Means and standard deviations were generated for the five outcomes (per individual): the number of (1) decayed (D); (2) missing (M); and (3) filled teeth (F); in addition to (4) the total DMFT score and (5) the CPITN score. The outcomes for the number of decayed and filled teeth in addition to the total number of DMFT include pooled data for both primary and permanent teeth, however, the number of missing teeth refers to missing permanent teeth only. For the comparison population, data was available on the mean values (standard deviations not reported) for the separate caries indices and the overall DMFT score for ages 6, 12, 15, and 35–44 years, mean DMFT score across genders and governorates for all ages except 6 years, and periodontal indices for all ages of interest. The Statistical Package for the Social Sciences software was used to carry out all data computations (IBM® SPSS® statistics 20.0, USA).

RESULTS

For all comparisons subgroups (gender, governorate, and overall), mean DMFT scores exhibited a general increasing trend with increasing age in both the ID and the NLP [Table 1]. For all age groups, overall DMFT score was larger in the ID than in the comparison group. The difference was smallest in the adult group (Mean DMFT =12.71 in ID and 14.68 in NLP) and largest for

Table 1: DMFT scores compared between the institutionalized intellectually-disabled and the normal Lebanese population

Population		Population							
		DMFT/dft Score Mean (SD)							Overall
		Gender		Governorate					
		Male	Female	Beirut	Mount Lebanon	Bekaa	North	South	
6 years [†] (n=141)	ID	3.41 (4.35)	3.72 (4.69)	3.50 (3.42)	2.98 (4.28)	3.16 (4.24)	3.29 (3.93)	5.07 (5.26)	3.50 (4.44)
	NLP	**	**	**	**	**	**	**	5.4
12 years (n=232)	ID	4.30 (3.83)	4.23 (3.51)	5.69 (3.23)	3.90 (3.45)	4.72 (4.15)	3.31 (2.85)	5.04 (4.35)	4.28 (3.72)
	NLP	5.93	5.53	5.22	5.33	6.79	4.56	9.26	5.72
15 years (n=152)	ID	4.27 (4.56)	5.46 (4.40)	10.00‡	4.32 (4.41)	6.63 (5.34)	4.82 (3.72)	4.82 (3.72)	4.80 (4.52)
	NLP	8.05	8.11	7.43	7.37	9.82	7.00	12.02	8.09
35-44 years (n=126)	ID	13.58 (7.77)	11.92 (7.08)	13.57 (6.40)	13.94 (7.98)	11.00 (6.83)	10.41 (6.17)	17.00‡	12.71 (7.43)
	NLP	13.84	15.44	13.48	13.32	16.70	12.36	18.39	14.68

ID = Intellectually-disabled, NLP = Normal Lebanese population, [†]Mean number of decayed and filled primary teeth (dft) reported for 6 year olds. All other indices refer to permanent teeth; ^{*}Separate indices for gender and governorate not reported for 6-year-old children in the NLP, [‡]Standard deviation not calculated because n=1

the 15 year olds (Mean DMFT =4.80 in ID compared to 8.09 in NLP). When comparing males and females, scores were generally similar in both the ID and the NLP with only minor differences. Some exceptions were noted; in the ID group aged 15 years, females had larger DMFT scores (5.46 ± 4.40) compared to males (4.27 ± 4.56); adult males in the ID group had larger DMFT scores (13.58 ± 7.77 and 11.92 ± 7.08 , respectively), and adult females in the NLP had larger DMFT scores than adult males (15.44 compared to 13.84 , respectively; Table 1).

Similar to the ID group, DMFT scores in the GLP were generally the highest in the South, although at age 15 the DMFT scores among the ID were similar or higher for all governorates except for Mount Lebanon [Table 1]. Similarly, among 12-year-old children with ID, DMFT scores were highest in Beirut rather than in the South (5.69 ± 3.23 and 5.04 ± 4.35 , respectively).

Six-year-old children with ID had lower numbers of primary decayed teeth (3.28 ± 4.45) but more filled teeth (0.22 ± 0.98) than the NLP (4.90 and 0.1, respectively; Table 2). For the remaining ages, the mean numbers of permanent decayed, missing and filled teeth were lower among the ID than the NLP with the following exceptions: similar numbers of missing teeth were recorded at age 15 and larger mean numbers of filled and missing teeth were recorded among the ID at age 35–44 years (6.24 ± 7.02 missing teeth and 3.31 ± 4.56 filled teeth compared to 4.98 and 2.50, respectively, in the NLP; Table 2).

The mean numbers of missing and filled teeth showed similar patterns across ages in the ID and NLP; slowly increasing up to the age of 15 and then exhibiting a sharp increase at the age of 35–44 years [Table 2]. This trend was similar to that observed for the overall DMFT score, which increased gradually up to age 15 in both ID and

Table 2: Separate caries indices compared between the institutionalized intellectually-disabled and the general Lebanese population

Age (years)	Decayed teeth (D/d)		Missing teeth (M)		Filled teeth (F/f)	
	Mean (SD)		Mean (SD)		Mean (SD)	
	ID	NLP	ID	NLP	ID	NLP
6 [†] (n=141)	3.28 (4.45)	4.90	N/A		0.22 (0.98)	0.10
12 (n=232)	3.90 (3.56)	5.14	0.16 (0.64)	0.24	0.22 (0.72)	0.34
15 (n=152)	4.01 (4.28)	6.80	0.34 (0.87)	0.34	0.45 (1.40)	0.95
35-44 (n=126)	3.17 (4.11)	7.20	6.24 (7.02)	4.98	3.31 (4.56)	2.50

ID = Intellectually-disabled, NLP = Normal Lebanese population,

[†]Mean number of decayed primary teeth (d) and filled primary teeth (f) reported for 6 year olds. All other indices refer to permanent teeth

the NLP and then increased sharply at age 35–44 years (12.71 ± 7.43 in ID and 14.68 in NLP; Table 1). The number of decayed teeth, on the other hand, displayed a gradual increase from age 6 (mean =4.90) to 35–44 years (mean =7.20) in the NLP but showed no such trend in the ID [Table 2]. In the disabled population, the number of carious teeth was lowest in the adult group (3.17 ± 4.11) and was highest among 15 year olds (4.01 ± 4.28).

In both the populations, CPITN scores worsened with age [Table 3]. There were some differences, however, in the distribution of periodontal disease between IDs and NLPs. Among the NLP, the highest prevalence was for the presence of calculus, both at age 15 (42.7%) and at 35–44 years (51.0%). The prevalence of health periodontium and bleeding on probing was larger in the ID group than the NLP (30.9% compared to 24.4% and 34.2% compared to 29.5%, respectively), however, the prevalence of pockets of 4–5 mm depth was also larger in the ID population (11.0% compared to 4.6% for the overall populations). This difference is especially

Table 3: Periodontal indices compared between the institutionalized intellectually-disabled and the normal Lebanese population

Age (years)	Healthy (%)		Bleeding on probing (%)		Supra/sub gingival (%)		Pocket (s) 4-5 mm (%)		Pocket (s) ≥6 mm (%)	
	ID	NLP	ID	NLP	ID	NLP	ID	NLP	ID	NLP
15	30.9	24.4	34.2	29.5	27.6	42.7	7.2	3.2	0.0	0.3
35-44	20.0	7.6	20.0	19.7	35.8	51.0	15.8	13.6	8.3	8.1
Total	26.1	10.9	27.9	11.7	31.3	13.0	11.0	4.6	3.7	1.5

ID = Intellectually-disabled, NLP = Normal Lebanese population

apparent for 15 year olds where the prevalence of pocketing (4–5 mm) was 7.2 in the ID compared to 3.2% in the NLP. With respect to deep pocketing greater than or equal to 6 mm, there were almost similar proportions within each population, though the proportion in the ID group (overall) was slightly higher (3.7% compared to 1.5%, respectively; Table 3).

DISCUSSION

Estimations suggest there are over a billion people living with disability, representing approximately 15% of the world's populations.^[23] In the majority of cases, this disadvantaged population faces major social challenges. Pitied by the society, disparaged, ignored, isolated, and hidden away in institutions, they are often deprived of basic and essential healthcare services.^[6,9] Oral health has been reported to be the most unattended health need among the disabled, the provision of which remains a challenge in the 21st century.^[16,24-26] Individuals with intellectual disability have been found to suffer from dental disease up to seven times as frequently as the general populations, particularly with respect to periodontal disease, oral mucosal pathology, and malocclusion.^[6-8,16] In a population study of adults with an intellectual disability, Beange *et al.* (1995) noted that 86% of the participants suffered from dental disease, representing the most frequent health problem for this group.^[17] The data of this study represents the first assessment of oral health in the ID population in Lebanon and is the results of an exhaustive survey that was conducted in an attempt to include all registered institutionalized handicapped persons in the country.

Several studies have highlighted higher prevalence rates and severity of oral disease among the ID populations when compared to the general population.^[27] When compared to healthy individuals of the same age, most studies show that individuals with intellectual disability have poor oral hygiene and higher prevalence of gingivitis and periodontitis.^[28-33] However, data on dental caries prevalence are not consistent. While some studies have shown higher disease prevalence in individuals with disability,^[34] other studies have reported similar or even lower decay rates in healthy individuals of the

same age.^[33-36] Shaw *et al.* (1986) reported very similar DMFT scores for disabled and nondisabled children at the ages of 8, 12, and 15 years.^[33] Choi *et al.* (2003) even reported lower DMFT/dft scores and a higher prevalence of gingivitis among the disabled than that in nondisabled persons.^[34] Our study similarly illustrated lower mean DMFT/dft scores among the institutionalized ID participants in comparison to the normal population for all age groups assessed. However, the comparison study used as a reference to represent the normal Lebanese population was undertaken in 1994, two years after the end of the civil war which started in April 1975 and lasted 17 years. This war left significant detrimental impact on the economic and social situation as well as on the health sector. It has been suggested that the elevated caries indices reported for the NLP are reflective of the war circumstances.^[22] It may, therefore, be argued that the results of the 1994 study may not be reflective of the situation in Lebanon today. This study is nonetheless the most recent study to assess both DMFT scores and the periodontal condition among children and adults comparable to those assessed by our studies. Although scarce, few other studies have since assessed some aspects of oral health in various age groups. Shortly after the National Oral Health Survey, Doughan *et al.* reported even higher DMFT scores among adults examined in the year 1996 at 16.3 teeth.^[37] The high score was mainly explained by the lack of a fluoridation program at the national level and poor dietary habits.^[37] In another similar based on data collected in 2000, DMFT scores were 3.42 and 5.44 in 12 and 15 year olds, respectively, lower than that in 1994 and closer to the values obtained in the ID population in our study.^[38] The authors of this study explain the drop in DMFT scores either due to improved oral hygiene or changes in the examination criteria, having followed closely the WHO criteria, recorded only obvious lesions, and avoided the use of sharp dental explorers to explore potential cavities. These procedures are more in line with those utilized in this study and the results are therefore more comparable. Following more than a decade lacking research on the status of oral health in Lebanese children and adults, Hanna *et al.* (2015) reported mean DMFT scores of 7.30

and 3.50 in 6–11-year-old children attending public and private schools, respectively.^[39] Unfortunately, neither overall DMFT score nor data by age are reported, thereby limiting comparisons. In a recent unpublished thesis, DMFT scores reported for adolescents aged 12–18 were 5.83 and 4.08 in public and private schools, respectively.^[40] Although the wide age group limits comparability to our data, the values reported for this adolescent sample are somewhat similar to the scores recorded among our 12 and 15-year-old ID population.

Apart from the overall DMFT scores, ID children aged 12 and 15 years received less restorative treatment (filled teeth) than those of the same age in the comparison study from the NLP. In addition, the number of missing teeth was larger in the ID population than that in the NLP for adults. These results support increasing research pointing to the reduced access of disabled persons to the needed oral health care services due to various barriers such as the disabled person's inability to communicate their symptoms and poor cooperation with treatment.^[10,11,41] Previous studies have also reported similar findings. Compared with representative data on the oral health of German adults, individuals with intellectual disabilities had more extracted teeth than normal adults,^[42] and the same was reported among German athletes with ID.^[43] In other countries, it was also observed that, due to the reduced cooperation, the dental treatment for persons with intellectual disabilities consisted mostly of extractions.^[6,44] This phenomenon may be the result of the tendency for emergency extractions (because of delayed seeking of treatment) or due to difficulties in behavioral management during dental procedures favoring measures that are less technique sensitive such as the extraction of teeth rather than their restoration.^[6,33,45]

Despite lower DMFT scores among the assessed ID population when compared to the historical comparison, the results nonetheless represent poor oral health compared to WHO standards and compared to the global situation.^[46] Among the assessed ID population, both the mean DMFT score of 4.28 estimated at age 12 and the mean score of 12.71 estimated at age 35–44 years are considered at the higher end of a moderate DMFT score, the cut-off values for severe being 4.4 and 13.9 for 12 and 35–44 year olds, respectively.^[46] Using the age of 12 as a benchmark for comparisons of global DMFT, studies have shown a definite trend of decreasing DMFT scores globally from 2.43 in 1980^[47] to 1.86 in 2015.^[48] The DMFT score estimated in the ID Lebanese population at age 12 is higher even compared to estimates in the Eastern Mediterranean region (DMFT = 1.64).^[48]

Adolescents and adults with ID in our study had more severe periodontal disease and reduced levels of

calculus compared to the NLP. This is unusual because in the normal population calculus is usually associated with severe periodontal disease. However, lower levels of calculus for ID individuals have previously been reported, especially in individuals with Down syndrome.^[49] Research has also shown that people with Down syndrome and other disabilities are more susceptible to periodontal disease and have a greater need for oral hygiene compared to the general population.^[33,50,51] Therefore, the reason behind the comparatively lower proportion of participants with only calculus in the ID population may simply be explained by greater progression to more severe periodontal diseases and is supported by the greater prevalence of pocketing among the ID than the NLP. Reduced manual dexterity and subsequent difficulties in tooth brushing may be the cause of poor health condition in this group. In fact, they often depend on other people such as parents or caregivers for oral health hygiene practices, in contrast to individuals without disabilities who usually take care of their own oral health.^[52]

Studies are increasingly demonstrating the ability to achieve lower DMFT scores in the disabled than that in the normal population in the presence of adequate preventive measures, assisted care, and public dental health services.^[16,53] Our results may or may not support this observation because definite conclusions are limited due to the greater than 20-year difference between our ID study population and the comparison group. If the results of the first National Oral Health Survey hold true today, they may indicate that the institutionalized ID population in Lebanon is receiving some form of oral hygiene instruction comparable to or even better than the normal population (though still lacking compared to the global standards). This, however, gives no indication regarding the oral health of the ID outside facilities, an area of research that needs to be planned as part of future comprehensive assessments of oral health in various segments of the Lebanese population. It is also possible that the data from 1994 is reflective of a specific social, economic, and political post-war context, and is in fact worse than the current situation, in which case oral health among the institutionalized ID may be similar to or worse than the NLP. Again, the lack of information warrants future national surveys conducted in the same age groups to produce meaningful data that will allow more accurate comparisons with historical data on the NLP and with our work on this vulnerable segment of the population. Although our data cannot be generalized to the entire ID population (residing outside of institutions) and cannot also be generalized to age groups other than those assessed, our study is the first to assess the oral health in the ID in Lebanon and to attempt comparison with

the NLP. The lack of recent data on the NLP is reflective of the inadequate allocation of resources towards the assessment of oral health in the Lebanese population in general, and in vulnerable populations such as the ID, in particular.

The elevated levels of poor periodontal health recorded in the ID population, even when compared with information on the NLP from a vulnerable post-war period, warrant public health interventions that raise awareness on the importance of adequate oral hygiene practices among the ID population. Parent and caretakers' poor understanding of the importance of health management and their crucial role in its provision,^[52] the use of anticonvulsant medications that affect gum health,^[54,55] and the fear of dental procedures^[56] are all factors that promote poor oral health among individuals with disabilities. Family members and caretakers are especially crucial in the oral hygiene process of dependent ID individuals both in the provision of assisted brushing and in monitoring the need for professional dental care because ID individuals are often unable to communicate their oral health needs or express their symptoms accurately.^[50] Caretakers must be encouraged regarding involvement in preventative oral health measures including tooth brushing, flossing, mouth rinsing with 0.2% Chlorhexidine solution, and frequent prophylactic dental care. Practicing and future dentists must also be educated regarding the proper management of this vulnerable population through continuing education course and the curriculum changes in dental schools.

CONCLUSION

Poor oral health indices and particularly poor periodontal conditions were highlighted in the ID population in Lebanon. If adequate services are to be provided, policy changes and implementation must comply with the findings of this study. Future prospective studies should be conducted to attempt comprehensive assessments of the oral health of the normal Lebanese population in addition to vulnerable populations to provide comparable data that is crucial for the policy changes and resource allocation.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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